TRIPLETT

INSTRUCTION MANUAL

MODEL 630-PLK TYPE 6
VOLT-OHM-MILLIAMMETER

WARNING

Electrical circuits can be dangerous and/or lethal when carelessness or poor safety practices occur. Every effort has been made to design this test equipment to prevent accidental shock, but no instrument can be completely safe when used incorrectly.

READ THE MANUAL

Voltages and currents within the capability of this test equipment can be hazardous. Follow the instructions in this manual for every measurement. Read and understand the general instructions before attempting to use this tester.

SAFETY CHECK

Double check the switch setting and lead connections before making measurements. Are you following all of the instructions?

Disconnect the tester or turn off the power before changing switch positions.

DON'T TOUCH

Don't touch exposed wiring, connections or other "live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Turn off the power to a circuit before clipping test probes to it. Be sure there is no voltage present before you touch the circuit.

HIGH VOLTAGE IS DANGEROUS

Always start with the power off. Be sure there is no voltage present before making connections to the circuit.

Don't touch the tester, its test leads, or any part of the circuit while it is on.

Before disconnecting the tester, turn the circuit off and wait for the meter to return to "zero."

DISTRIBUTION CIRCUITS PACK A PUNCH

In high energy circuits such as distribution transformers and bus bars, dangerous arcs of explosive nature can occur if the circuit is shorted. If the tester is connected across a high energy circuit when set to a low resistance range, a current range, or any other low impedance range, an explosive short can result.

Special equipment designed for use with these circuits is available. Contact a qualified person for assistance before attempting to make measurements on any high energy circuit.

SAFETY IS NO ACCIDENT

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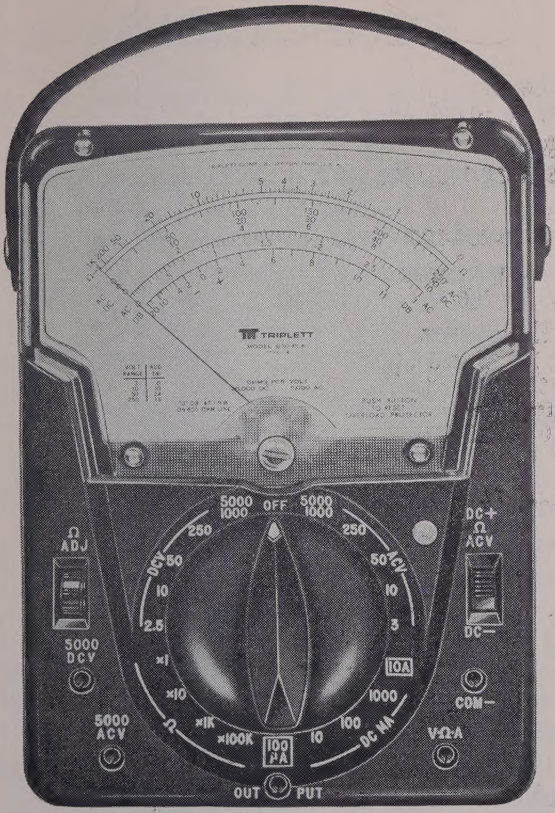


Model 630 PLK

SPECIFICATIONS

DC Millivolts
0-250 at 10,000 ohms per volt.

DC Volts
0-2.5-10-50-250-1000-5000 at 20,000 ohms per volt.

AC Volts
0-3-10-50-250-1000- 5000 at 5000 ohms per volt.

DC Microamperes
0-100 at 250 Mv.

DC Milliamperes
0-10-100 at 250 Mv.
0-1000 at 400 Mv.

DC Amperes
0-10 at 600 Mv.

Ohms
0-1000-10,000 (4.4-44 at center scale).

Ohmmeter Specifications

	Range			
	X1	X10	X1K	X100K
Maximum Voltage—Volts	1.6	1.6	1.6	34
Maximum Current—MA.	364	36.4	.364	.0773
Maximum Power Transfer to Load—MW.	150	15.0	.150	.655

Megohms
0-1-100 (4400-440,000 at center scale).

Output Volts (AC)
0-3-10-50-250 at 5000 ohms per volt.

Decibels
—20 to +11, 21, 35, 49, on 600 Ohm line.

Protection
Comprehensive overload protection features protect both meter and complete VOM from burn-out.

Scales
4.5 inches long (max.)

Batteries
One 1.5 volt and one 30 volt battery. Batteries are packed separately.

Test Leads
One red and one black lead supplied, each 48 inches long. Two push-on type alligator clips included.

Rubber Feet
Four rubber feet are supplied to fit into four holes in the rear of the VOM case.

Size
3-11/32" x 5½" x 7½"

Weight
Approximately 4 lbs.

ACCURACY
(Calibrated at 77° F.)

DC Ranges

5000 volt	4% of full scale
All others	2%

AC Ranges (Calibrated on 60 cycle sine wave)

5000 volt	5% of full scale
All others	3%

Resistance Ranges

All	2% of scale length

INTRODUCTION

The Model 630-PLK is a compact, rugged, portable volt-ohm-milliammeter. It has been designed to make fast, accurate measurements on all types of electrical and electronic equipment and is backed by a company which has been making quality instruments and test equipment for over half a century.

PROTECTION FEATURES

The Model 630-PLK is equipped with an overload protection circuit to protect against overloads which normally would damage or destroy circuit components and/or the meter. The protection circuit uses a transistorized amplifier which controls a manually reset latching type relay. The amplifier senses the voltage across the meter terminals. When this voltage reaches four to six times the rated full scale meter voltage, the amplifier "fires" and energizes the relay. Smaller overloads, not sufficient to make the amplifier "fire," will not cause damage to the instrument. The relay contacts, located in the VOM input circuit, latch open and remain open until the manual reset button (located to the right of the selector switch on the front panel) is depressed.

Auxiliary contacts on the relay automatically disconnect the battery from the relay immediately after the relay is energized thus preventing continuous battery drain when the relay is energized. This feature allows the Model 630-PLK to be left in the relay energized condition (input circuit relay contacts open) for indefinite periods with no battery drain. In the normal operating condition (reset button in), the transistorized protection amplifier draws negligible stand-by current (less than 1 microampere—the approximate shelf life drain on the 30 volt battery).

The overload protection feature is intended to guard against occasional human error, not to encourage careless instrument use. Particular care should be exercised to prevent the application of voltages exceeding 300 volts to the current and low ohms ranges as the low impedance of these circuits may cause momentary surges of current beyond the capacity of the overload relay contacts. The

fuse in the input circuit provides added protection for the relay contacts; under some conditions the fuse may blow in addition to the overload relay contacts opening.

All ranges of the Model 630-PLK are provided with protection to prevent damage as follows:

1. The 1 and 10 ampere ranges are protected by 3 and 10 ampere fuses respectively.
2. The inherent high resistance of the 100K ohm, 1000 and 5000 Volt AC and DC range circuits limits current to a level which will not damage the instrument.
3. All other ranges are protected by the transistorized overload protection circuit previously described.

As an added protection to the meter, a silicon diode network prevents damage to the meter pointer by by-passing instantaneous transient voltages that might bend the meter pointer before the relay contacts open.

PRECAUTIONS

The 30 volt ohmmeter battery must be installed and tested before the 630-PLK is placed in service since this battery is used in the overload protection circuit. After installing the batteries, they should be tested as follows:

1. Turn the selector switch to the X100K position.
2. Short the test leads together.
3. Adjust the meter pointer to zero ohms with the ohms adjust control. If the pointer cannot be set at zero the 30 volt battery should be replaced at once. DO NOT operate the Model 630-PLK if the 100K ohms range will not zero since the overload protector will not operate properly.

This procedure should be repeated periodically to insure proper operation of the overload protection circuits.

Depressing the overload protector reset button, while an overload is still being applied to the VOM will not cause the relay contacts to close. Therefore, it is necessary to remove the overload from the VOM before the overload protector can be reset.

GENERAL INSTRUCTIONS

The following section should be read carefully; it contains instructions and precautions to be observed in making measurements with the VOM.

• Measurements are made with the test leads plugged into the COM— and V-Ω-A jacks, except when measuring output volts (DB), 5000 AC and 5000 DC volts. For these ranges the V-Ω-A test lead is plugged in the appropriate jack (one test lead is in the COM— jack for all measurements).

• The alligator clips provided with the VOM fit over the end of the test probes. When measuring high voltages, the use of these alligator clips will allow measurement without handling the test probes. As a safety measure, always shut off power source before attempting to connect alligator clips.

Caution: If the VOM has been overloaded—disconnect the test probes from the power source before depressing the "reset" button.

• When the approximate value of the quantity being measured is not known, always start on the highest range. For greatest accuracy, choose the range which will allow readings to be taken in the upper (right hand) portion of the scale.

• Readings are taken on the scale having the appropriate significant figures (both 2.5 and 250 volts are read on the 0-250 scale) by multiplying or dividing by a factor of 10 or 100 as indicated by the range/scale ratio (ie; on the 2.5 volt range divide the scale readings by 100).

• The polarity reversing switch reverses the polarity of the entire VOM at the input jacks. This allows fast switching in case of wrong polarity; and also provides a convenient polarity reversal for ohms ranges, a very useful tool in semiconductor checking. The V-Ω-A jack is positive when the polarity switch is in the DC+-Ω-ACV position.

• Whenever possible, the test probes should be disconnected from the voltage source (or the source shut off) before the range switch or polarity switch positions are changed. This practice will result in an increased life and reliability for the VOM.

• The Meter Zero Adjust Screw is located on the lower center of the meter cover. It should be periodically adjusted so the meter pointer is on zero with no input into the VOM.

• Readings on the sensitive voltage, current and resistance ranges may sometimes be different than calculated values. Thermo-electric or electro-chemical reactions can sometimes generate voltage (or current) in a circuit due to elevated temperatures from soldering, contact of dissimilar metals, chemical fumes or moisture. Also, the fingers should never touch the metal parts of the test probes since body resistance can cause erroneous readings—particularly on the high ohmmeter ranges.

CAUTION: Always observe the following rules and procedures when making measurements in high voltage circuits;

1. Turn off equipment or other source of voltage, before connecting test probes. Make sure no capacitors in the circuit being tested remain charged to a high voltage.

2. Install alligator clips on test probes. While holding the insulated section of the test probe, check circuit to see if any voltage (or current) is present. If no voltage is present, connect the alligator clips to the circuit to be measured.

3. Turn on equipment, or voltage source, and take required readings. DO NOT handle or touch the VOM, test leads or test probes with power source turned on.

Observing the above rules and precautions will result in continued accurate measurements with your VOM or increased safety to equipment and personnel.

MEASURING DC VOLTS

0-250 DC Millivolts:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in 100 μA position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 1.
4. Read DC millivolts on black scale.

0-2.5 thru 0-1000 DC Volts:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in appropriate DCV position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 1.
4. Read voltage on black scale.

0-5000 DC Volts:

1. Insert test leads in 5000 DCV and COM—jacks.
2. Place selector switch in 5000 DC volt position.
3. Observe all rules and precautions in "General Instruction" section.
4. Connect the test probes across the voltage to be measured as shown in Fig. 1.
5. Read voltage on black scale.

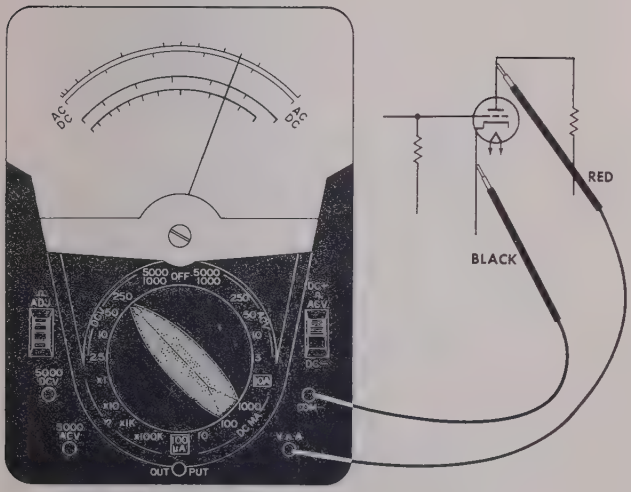


Fig. 1. Measuring DC Volts.

MEASURING AC VOLTS

0-3 AC Volts:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in 3 VAC position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 2.
4. Read voltage on lower red 0-3 "AC" scale.

0-10 thru 0-1000 AC Volts:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in appropriate ACV position.
3. Connect the test probes across the voltage to be measured as shown in Fig. 2.
4. Read voltage on black scale.

0-5000 AC Volts:

1. Insert test leads in 5000 ACV and COM—jacks.
2. Place selector switch in 5000 ACV position.
3. Observe all rules and precautions in "General Instruction" section.
4. Connect the test probes across the voltage to be measured as shown in Fig. 2.
5. Read voltage on black scale.

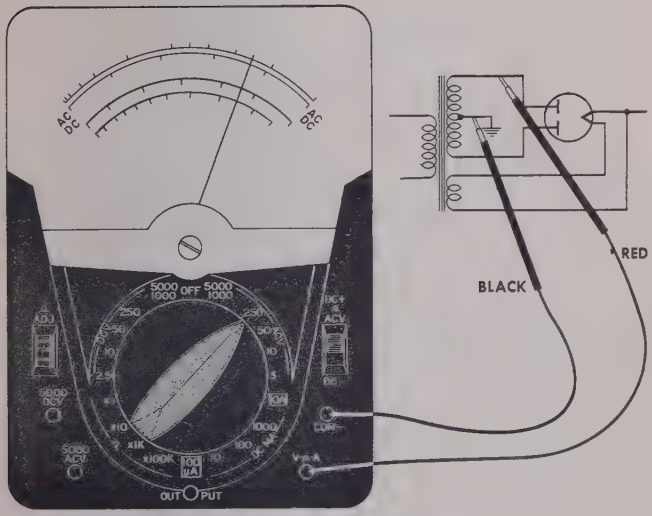


Fig. 2. Measuring AC Volts.

MEASURING DC CURRENT

0-100 μA thru 0-10 Amps:

1. Insert test leads in V-Ω-A and COM—jacks.
2. Place selector switch in appropriate position.
3. Connect the test probes in series with the circuit (use alligator clips) as shown in Fig. 3.
4. Read current on black scale.

The voltage drop across the VOM on all current ranges is 250 millivolts at full scale current. In most cases this voltage drop will not affect the circuit being measured; however, in some low voltage transistor circuits it may be necessary to compensate the circuit on readings for the added voltage drop.

NOTE: The 1000 MA and 10A ranges are fused for overload protection. If meter fails to indicate, a fuse may be blown. (See Fuse Replacement Section under "Maintenance.")

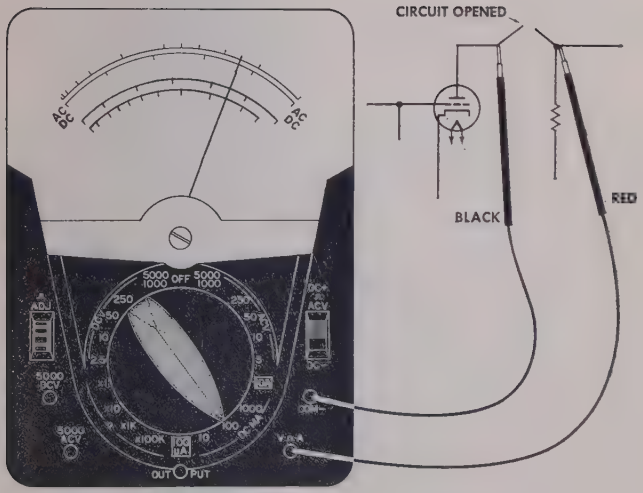


Fig. 3. Measuring DC Current.

MEASURING DC RESISTANCE

X1 thru X100K Ohms Ranges:

1. Place selector switch in appropriate ohms range.
2. Short test probes together.
3. Adjust "ΩADJ" control until meter reads zero ohms.
4. Connect test probes to component being measured.
5. Read ohms on top red "Ω" scale (multiply value read times range switch factor).

The component being measured should be disconnected from the circuit before its resistance is measured since any added circuit path can cause an error in measurement. Also, any voltage or current present in the circuit during measurement can cause an error in resistance measurement.

When using the ohmmeter for general continuity and circuit tracing it is recommended the X1K resistance range be used. The lower battery drain on this range (compared to the X1 range) will result in increased battery life.

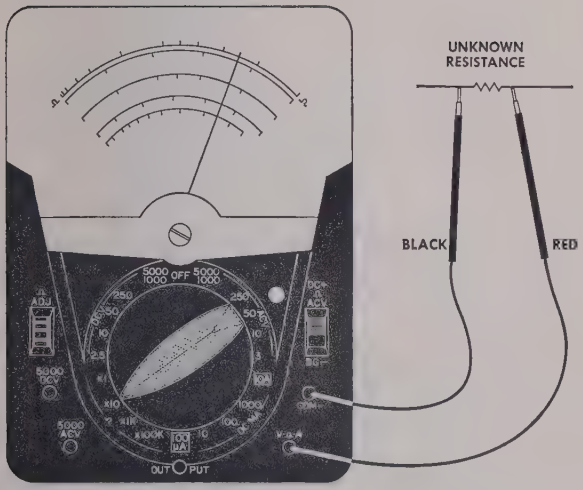


Fig. 4. Measuring DC Resistance.

MEASURING OUTPUT VOLTAGE

Output voltage is the AC part of a combined AC and DC voltage. Such a voltage is usually found in amplifier circuits, but it may also be found in other circuits. To measure output voltage, the DC part of the combined voltage must be removed or "blocked." This is done by inserting a capacitor in series with the AC voltage section of the VOM. The Model 630-PLK has a .1μfd, 400 VDC capacitor between the OUTPUT and V-Ω-A jacks to do this.

0-3 Volts (Figure 16):

1. Insert test leads into the OUTPUT and COM— jacks.
2. Set the selector switch to 3 ACV position.
3. Connect test probes across the voltage to be measured.
4. Read voltage on the Red 0-3 "ACV" scale.

0-10 thru 0-250 Volts (Figure 16):

1. Insert test leads into the OUTPUT and COM— jacks.
2. Set selector switch to appropriate ACV range.
3. Connect test probes across the voltage to be measured.
4. Read voltage on "AC-DC" scale.

DO NOT USE THE OUTPUT range in circuits where the sum of the DC voltage and the peak AC voltage is greater than 400 volts.

The impedance of the capacitor is generally insignificant at audio frequencies. However, it may cause the meter to read low at low frequencies. Its effect should be considered in critical low frequency measurements.

WHEN THE VOLTAGE BEING MEASURED is AC with no DC present, the standard AC voltage measurement procedure should be used.

(Measuring Decibels (dB) See Page 21)

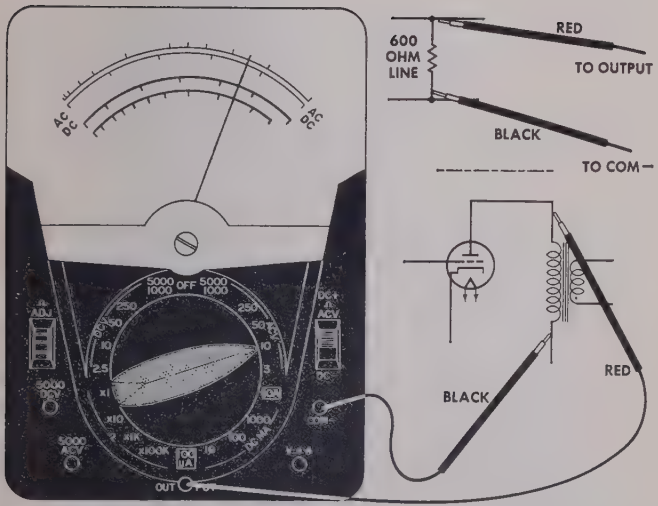


Fig. 5. Measuring Output Voltage

MAINTENANCE

Battery Replacement

Two batteries are used in the ohmmeter circuits.

A 1.5 volt Burgess No. 2 battery, or equivalent, is used in the X1, X10 and X1K ranges. If the pointer cannot be adjusted to zero when the selector switch is on one of these ranges and the test prods are touched together, the 1.5 volt battery should be replaced.

A 30 volt Burgess U2OE battery, or equivalent, is used in the X100K range. The 30 volt battery should be replaced if the pointer cannot be adjusted to zero when the selector switch is on the X100K range and the test prods are touched together.

The 30 volt battery is also used in the overload protective circuit. This battery must be installed and in good condition or the overload protective circuit will not operate.

To replace the batteries, remove the four screws in the bottom of the case and lift the back up and off. Remove the old batteries and replace with new ones. Be careful to observe polarity as indicated on the battery compartment.

Fuse Replacement

Spare 3 amp and 10 amp fuses are supplied with this instrument and are stored in the bottom of the battery compartment. CAUTION: Use only the fuses supplied or identical fuses as listed in the parts list. The substitution of fuses of other types and values may not afford proper protection and may also disturb the accuracy of the meter.

Cleaning The Plastic Window

The plastic window has been treated at the factory to dissipate static charges that otherwise would attract the meter pointer and make it cling to the window.

If cleaning is required, use cotton dipped in a solution of household detergent and water. After cleaning, allow the solution to dry without rubbing or polishing.

Care

- Although this instrument is portable and rugged it should be treated with care. Do not drop or handle it roughly.
- Avoid placing it on a bench where machine tools are used or severe vibration is encountered.
- When possible keep it in a place of moderate temperature. Avoid subjecting it to extreme temperatures and severe temperature changes.
- If the VOM has not been used for a long period of time, rotate the selector switch in both directions several times to wipe the switch contacts for good contact.
- Turn the selector switch to OFF when the VOM is to be carried. The meter is damped in the OFF position to prevent wild swinging of the pointer.

MEASURING DECIBELS (dB)

The decibel is a unit that expresses the ratio of power levels. It is mathematically derived to reduce multiplication and division to addition and subtraction, respectively, (e.g. — 10 dB represents multiplication by 10, 20 dB — 100, 30 dB — 1000). The decibel roughly approximates human hearing ratios. For this reason, it is commonly used in audio and telephone measurements.

Because the decibel represents a ratio, there is a reference level. The Model 630-PLK reference level for 0 dB is 1 milliwatt into a 600 ohm load (.775 ACV across 600 ohms). Measurements made across loads other than 600 ohms are relative measurements.

To measure decibels, connect the Model 630-PLK the same as for measuring AC voltage (or OUTPUT voltage, if there is DC voltage present). But, read the dB scale instead of the voltage scales. A chart on the dial shows the dB values to be added to the reading for the different voltage ranges. (e.g. — When the selector switch is set to the 50 VAC position, add 24 dB to the indicated value.) As explained above, addition of dB represents multiplication of power (or voltage).

ACCESSORIES

The usefulness and range of the Model 630-PLK can be extended by the use of the following listed accessories.

HIGH VOLTAGE MEASUREMENTS

Accessory probes are available for measuring high voltages such as found in television receivers and other equipment. To use these probes, plug the probe into the V-Ω-A jack, connect the black ground lead into the COM—jack, and set the selector switch to the position indicated below.

Use extreme caution in measuring high voltages—observe all the rules and precautions listed in the "General Instructions" regarding high voltage measurements.

Probe Part No. Kilovolt	Range	Set Selector Switch To:	Read on Range:	Multiply By:
79-165	0-10KV AC	3V AC	0-10V AC	1000
79-83	0-10KV DC	2.5V DC	0-10V DC	1000
79-130	0-25KV DC	2.5V DC	0-250V DC	100
79-166	0-25KV AC	3V AC	0-250V AC	100

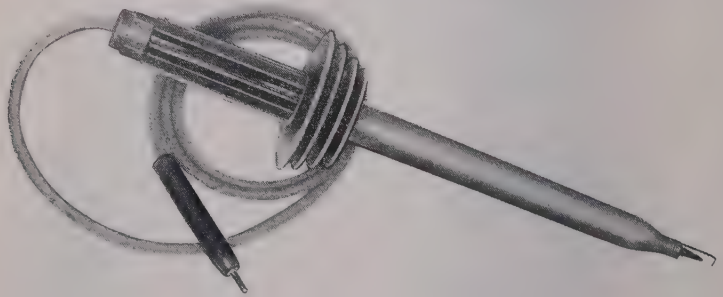


Fig. 6. High Voltage Probe.

MEASURING HIGH DC CURRENT

The use of accessory shunts extend the DC current ranges of this instrument.

PLUG-IN TYPE. Set the selector switch to the 10 DC MA position, plug the shunt into the V-Ω-A and COM—jacks and connect the circuit to be measured in series with the binding posts on the shunt.

Part No. 91-243
0-25 DC AMP

PORTABLE TYPE: Set the selector switch to the 10 DC MA position, plug the leads on the shunt into the V-Ω-A and COM—jacks and connect the circuit to be measured in series with the binding posts on the shunt.

Part No. 91-244 0-50 DC AMP
Part No. 91-191 0-100 DC AMP

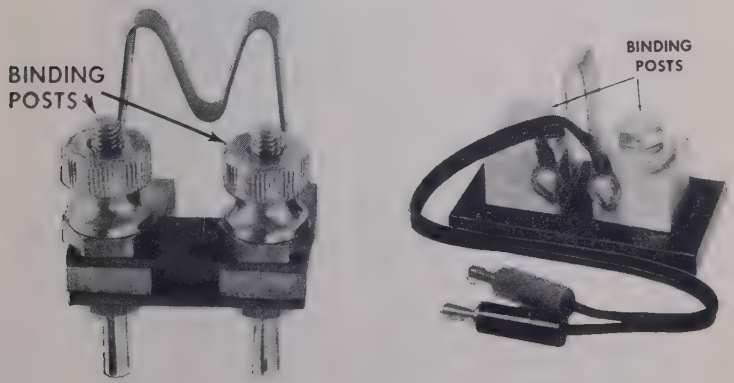


Fig 7. High DC Shunts.

AC CURRENT MEASURING ADAPTER

AC line loads can be checked easily, without breaking the conductors or insulation of the circuit under test, when the Model 10 CLAMP-ON AMMETER ADAPTER (Part No. 60A-211) is used. The Adapter is connected with a No. 611 LEAD ASSEMBLY (Part No. 79A-160). The lever on the side of the Model 10 Adapter is pressed to open the split yoke of the adapter so it can be placed over and closed around the lead or bus bar carrying the current being measured. Readings up to 300 AC amperes can be made.

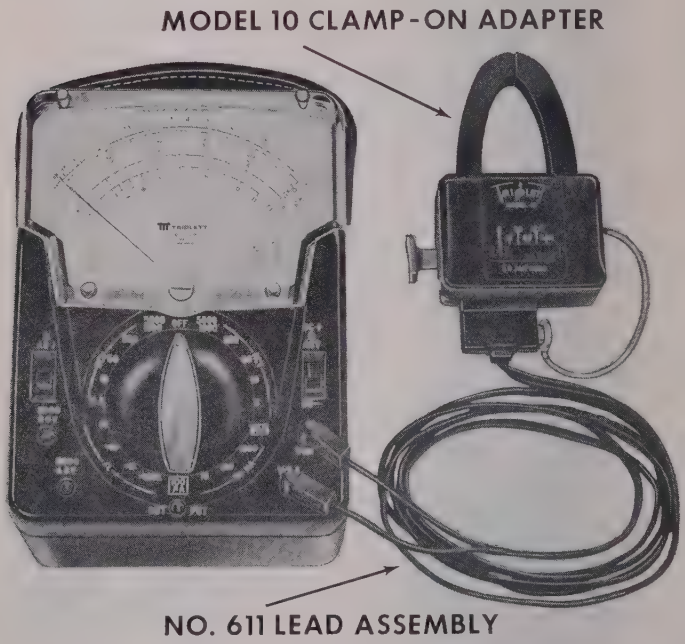


Fig. 8 Model 10 Clamp-On Adapter.

THE MODEL 101 LINE SEPARATOR (Part No. 60A-218) is used to divide a circuit using two-conductor cable so one conductor can be encircled by the adapter yoke. The Model 101 is plugged into the AC outlet and the AC cord of the equipment to be measured is plugged into the appropriate socket on the Model 101. The split yoke of the Model 10 Adapter is clipped through the loop in the Model 101 to make the current measurement. Use of the "Divide by 10" and "Divide By 20" sockets on the Model 101 Line Separator makes a convenient and fast method of measuring extremely low AC current.

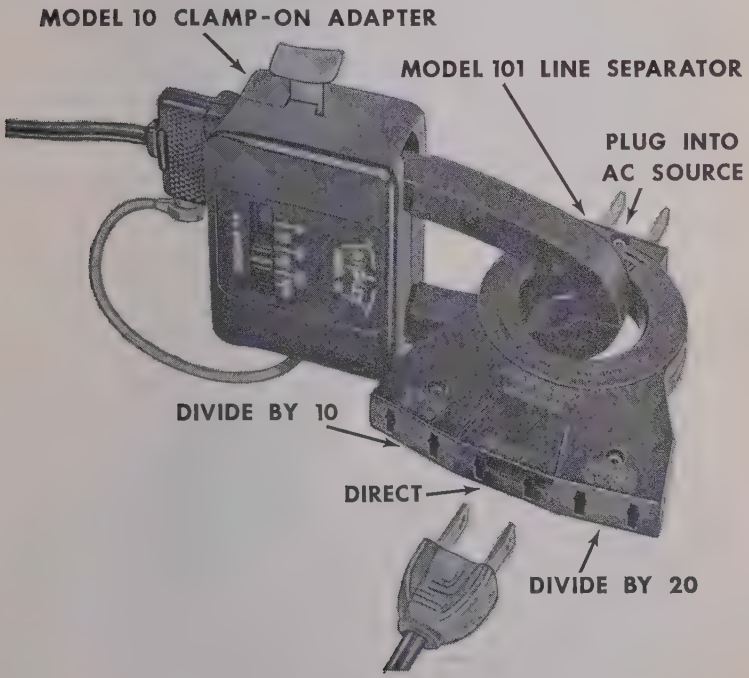


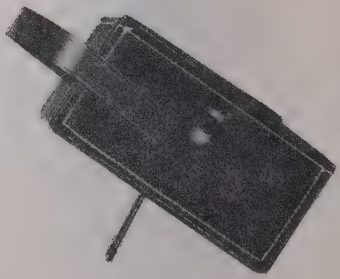
Fig. 9. Model 101 Line Separator.

LEATHER
CARRYING
CASE

MODEL 639-OS

CASE 639-OS

Black leather case, has built-in stand on back. Flaps open to permit use of tester in case. Compartment for accessories. For use with 630 series testers. Felt lined, Leather strap handle.



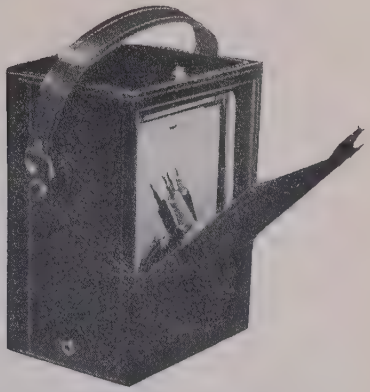
LEATHER CARRYING CASES

MODEL 639-N

639-N black cowhide leather carrying case. For use with 630 series testers. Stand included at no extra cost. Leather strap handle.

MODEL 639 leather carrying case has adequate space for Triplett 630 series tester, instructions, and accessories. Black cowhide leather, provided with strong leather strap handle.

MODEL 639-P is a leather carrying case padded with 3/8" sponge rubber which gives the instrument maximum protection. Has adequate space for any 630 series tester, instructions, and leads. Black cowhide; leather strap handle.



Rear view shows large accessory compartment permitting free access to tester stand, leads, and instructions.

MODEL 639/639-P

REPLACEABLE PARTS 630-PLK

Ref. No.		Description	Part No.
B1	Battery	30V (NEDA #210)	37-19
B2	Battery	1.5V (NEDA #13F)	2426-1
C1	Capacitor	.1 mfd. @ 400V	43-69
C2	Capacitor	Electrolytic, 10 mfd. 50V	43-256
F1	Fuse	10 amp 250V	3207-21
F2	Fuse	3 amp 125V, Slo Blo	3207-22
M1	Meter	50 μa 250 MV (Complete with VOM Front)	52-5841
R1	Resistor	3.75 meg	15-2842
R2	Resistor	1 meg	15K-1004TC5
R3	Resistor	200K	15K-2003TC5
R4	Resistor	35K	15K-3502TC5
R5	Resistor	5000Ω	15K-5001TC5
R6	Resistor	5000Ω	15K-5001TC5
R7	Resistor	.249Ω	15-5376
R8, R9	Not Used		
R10	Resistor	5000Ω	15K-5001TC5
R11	Resistor	8600Ω	15K-8601TC5
R12	Resistor	423K	15K-4233TC5
R13	Resistor	732Ω	15K-7320TC5
R14	Resistor	6.5Ω	15-4114
R15	Resistor	.15Ω	15-4261
R16	Not Used		
R17	Resistor	4690Ω	15K-4691TC5
R18	Resistor	45K	15K-4502TC5
R19	Resistor	150K	15K-1503TC5
R20	Resistor	800K	15K-8003TC5
R21	Resistor	4 meg	15K-4004TC5
R22	Resistor	7.5 meg	15-1262
R23	Resistor	7.5 meg	15-1262
R24, R25, R 26	Not Used		
R27	ΩADJ Control	20K	16-31
R28	Shunt Assembly	10 amp	90-1037

REPLACEABLE PARTS 630-PLK

Ref. No.	Description	Part No.
R29	Resistor 20 meg	15-1674
R30	Resistor Assembly 60 meg	15-2844
R31	Resistor 5100Ω	15R-512JC
R32A, B, C, D	Resistor Board Assembly, 2.5Ω, 3.66Ω 25.12Ω, 37.2Ω Wirewound	203-160
R33	Resistor Variable, 600Ω (Riveted to Back Assembly)	16-175
S1	Switch, Rotary 20 Position, 5 Section	22-466
	Switch, Rotary 20 Position, 5 Section With Resistors	22-583
SW2	Switch, Slide DPDT	22-152
CRA1	Rectifier Assem.	2250-30
CR1	Diode Assembly Meter Protection	11670
CRA2	Overload Protection Ckt. Bd.	87-416
K	Relay Assembly	11639
CR2	Diode	127-93
	Knob Red, With Spring	34-62
	Case With Handle	10-784
	Front Clear Plastic, with Zero Adjust	10-2212
	Leads Test (Pair)	79-127
	Pushbutton	62-3

REPAIR OR SERVICE

In the event repair or service is required, please outline the nature of the difficulty. By providing this information, Triplett can supply more efficient service.

Fig. 14. Schematic.

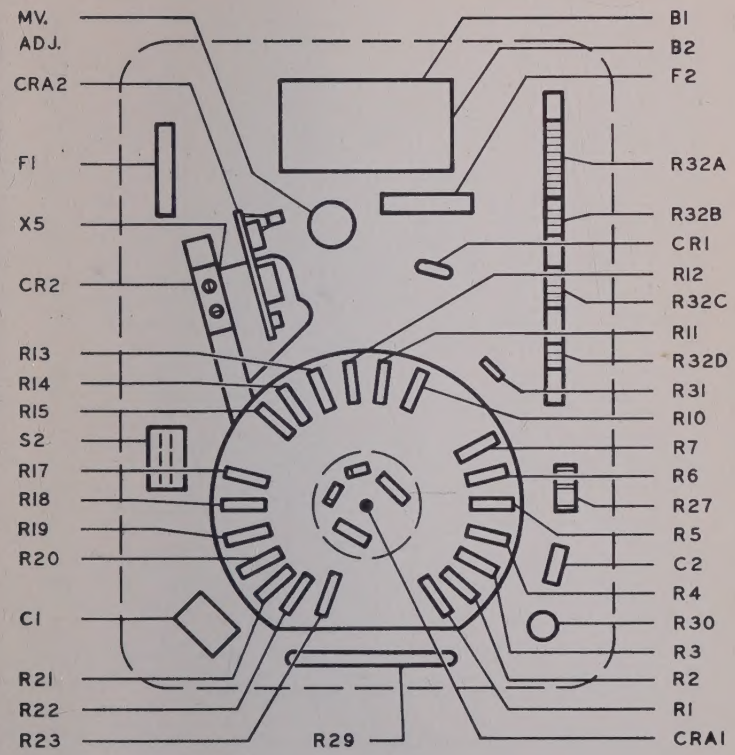


Fig. 13. Parts Location.

WARRANTY

The Triplett Corporation warrants instruments manufactured by it to be free from defective material or factory workmanship and agrees to repair or replace such instruments which under normal use and service, disclose the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing or replacing any instrument or test equipment which proves to be defective, when returned to us transportation prepaid, within one (1) year from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons or service stations in any way so as, in our judgment to injure their stability or reliability or which have been subject to misuse, negligence or accident or which have had the serial number altered, effaced, or removed. Neither does this warranty apply to any of our products, which have been connected, installed, or adjusted otherwise than in accordance with the instructions furnished by us. Accessories including batteries not of our manufacture used with this product are not covered by this warranty.

The Triplett Corporation reserves the right to discontinue models at any time, or change specifications, price or design, without notice and without incurring any obligation.

Upon acceptance of this material the purchaser agrees to assume all liability for any damages, and bodily injury which may result from the use or misuse of the material by the purchaser, his employees, or others and that the Triplett Corporation shall incur no liability for direct or consequential damage of any kind.

Parts will be made available for a maximum period of five (5) years after the manufacture of this equipment has been discontinued. Parts include all materials, charts, instructions, diagrams, accessories, et cetera, which were furnished in the standard or special models.

This warranty and conditions of sale are in lieu of all others expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

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